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ABSTRACT

In preparation for a conference held in Paris, France, in November 1994, the Organisation for Economic Cooperation and Development (OEC) launched 5-year program that involved 20 countries studying the changing role of vocational and technical education and training (VOTEC). This background document presents in question-and-answer format a synthesis of national studies on the knowledge and information base of VOTEC and its responsiveness. Issues raised include the following: (1) should vocational education be job-specific or more broadly based?; (2) how can the flow of knowledge between schools and science be improved?; (3) how can the flow of knowledge between schools and businesses be improved?; (4) what is the impact of various countries' institutional features on the flow of knowledge between schools, science, and industry?; (5) which other roles can vocational schools and training institutions perform with regard to innovation in small and medium-size enterprises?; and (6) what roles should governments perform in regard to knowledge transfers between schools, science, and industry? (KC)

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THE CHANGING ROLE OF VOCATIONAL AND TECHNICAL EDUCATION AND TRAINING (VOTEC)

VOCATIONAL EDUCATION AND TRAINING FOR THE 21ST CENTURY
OPENING PATHWAYS AND STRENGTHENING PROFESSIONALISM
STRENGTHENING THE KNOWLEDGE BASE
OF VOCATIONAL AND TECHNICAL EDUCATION AND TRAINING
ISSUES AND QUESTIONS FOR WORKING GROUP IV

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(Note by the Secretariat)

1. The attached document was prepared as a contribution to the high level conference on "Vocational Education and Training for the 21st Century - Opening Pathways and Strengthening Professionalism" which takes place on 28 - 30 November 1994 at the OECD in Paris. It provides questions and issues as a basis for discussion in **Working Group IV** on "Strengthening the knowledge and information base of VOTEC".

2. The author of the paper is Professor Willem Dercksen, Faculty of Social Sciences, University of Utrecht, Netherlands.

3. The document is circulated **for DISCUSSION**.

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Introduction: the diffusion of knowledge

1. The subject of Working Group IV is the knowledge and information base of Vocational and Technical Education and Training (VOTEC). The knowledge base of VOTEC regards **knowledge in VOTEC.** A main question in OECD's VOTEC activity is about "responsiveness": how do systems of vocational education and training respond to a changing environment and how may their responsiveness be improved? Concern about the knowledge base of VOTEC is a rather new way of dealing with the problem of responsiveness. The main objective of this paper is to explore the knowledge base of VOTEC and to raise issues and questions. A primary goal of Working Group IV will be to exchange information and discuss the ways in which different VOTEC systems deal with knowledge. Consequently, Working Group IV might alos contribute to the **information about VOTEC**.

2. With regard to the knowledge base of VOTEC, at least three dimensions can be distinguished:

-- Which knowledge? VOTEC's primary objective is to deliver professionality (expertise) by transfering relevant technical knowledge and skills with the help of pedagogical insights.

-- Flows of knowledge: VOTEC is part of knowledge networks in which science and industry (or their representatives) are main actors. These networks may contribute to the responsiveness of VOTEC.

-- Research on these flows of knowledge: research may provide insights, examples and standards to strengthen the knowledge base of VOTEC.

3. Following these three dimensions, a first objective of Working Group IV is to discuss the relevant expertise to be provided by VOTEC. Does VOTEC knowledge differ from academic knowledge? What is VOTEC's main business: transfer of knowledge, transfer of competencies or both? Should there be a division of labour between initial vocational education and recurrent training in this respect?

4. A second objective is to exchange information and ideas about ways to improve the responsiveness of VOTEC to rapidly changing levels and standards of knowledge. Attention will be paid to the ways in which science and industry "feed" vocational schools and training institution, as well as the other way around: how vocational schools and training institutions (may) contribute to the diffusion of knowledge into industry, especially into small and medium-size enterprises.

5. Finally, relevant questions for further research will be raised with regard to the knowledge base of VOTEC. Special attention is paid to the role which international organisations may perform in this respect.

Knowledge or competencies?

6. Traditionally, educational institutions transfer knowledge and information. Especially in the VOTEC area, knowledge includes skills. This raises the question whether VOTEC knowledge differs from academic knowledge. The principal argument against such a sharp distinction is that many skills pre-suppose a certain amount of academic knowledge. For instance, an electrician should have some academic knowledge about electricity to do his job properly. Consequently, within different vocational curricula varying combinations of academic knowledge, skill and experience are to be found. A fruitful approach might be to suppose a continuum, ranging from pure theoretical knowledge on the one hand to craft skills on the other. Vocational education and training programmes concentrate more on one side of such a continuum, and general and academic education more on the other. Nevertheless, all education provides, or should provide, academic knowledge as well as skills.

7. It is almost a platitude to observe that educational qualifications do not last for life in modern labour markets. Recurrent training is a "must" for growing numbers of workers. A logical, but insufficiently implemented consequence is that initial vocational education should provide the foundation for recurrent training during working life.

Does the need for "learning to learn" put into question the acquisition of occupational expertise ("professionality") as a goal of initial education and training?

8. Several countries (Australia, Canada, Germany, Malaysia, Singapore, South Korea, United Kingdom) promote the (further) institutionalisation of competency-based training in VOTEC. Competencies refer to combinations of knowledge and skills required for specific jobs. In these countries, special efforts are made to develop key competencies (basic skills) and to implement them in vocational curricula. Key competencies include: compilation and analysis of information, communication, organisation of activities, cooperation, use of mathematics, problem-solving, use of skills in new situations.

Is competency-based training a frame of reference for the future knowledge base of VOTEC? Does this also imply the necessity of reducing the degree of specialisation in initial vocational education?

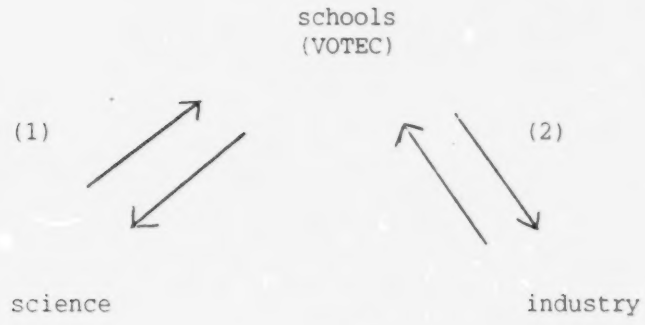
9. Most (all?) OECD countries show a considerable growth in expenditures on recurrent (further / continuing) training. With regard to training, flexibility is a key word today. Training institutions may provide "tailor-made" training. Training provides workers with the opportunity to acquire new knowledge and skills in order to maintain or improve their labour market position. For school-leavers, training may provide the opportunity to acquire knowledge and skills which are necessary for a specific job. For employers training is a means of increasing competitiveness. "Training" might be regarded as a complement to basic (vocational) "education".

Does the expansion of training imply a division of labour according to content, between initial education on one hand and the recurrent training sector on the other? Is it sufficient if the core curriculum of vocational schools consists of competency based training, enabling providers of recurrent training to develop complementary and specialised training programmes?

Flows of knowledge

10. How should knowledge and information be transferred between relevant actors in the VOTEC area? Relevant actors in this respect are schools (vocational schools and training institutes), science (universities, research institutes, etc.) and industry (firms and industry organisations, including public employers). Politics and industrial relations are not directly involved in the knowledge and information base of VOTEC. However, they do determine relevant conditions and fulfil important functions as intermediaries and/or representatives in many countries. Exchange of knowledge may go in all directions (diagram 1). "Responsiveness" might be regarded as an important objective.

Diagram 1: VOTEC and its knowledge base



11. Flows of knowledge between schools and science (1) may take several (non-exclusive) forms:

-- recurrent training of teachers

-- diffusion of technical, pedagogical and labour market research

-- scientific input in curriculum development (scientists may be consulted, teachers and textbook writers may take advantage of recent scientific knowledge, etc.)

-- cooperation between schools and science in developing or adapting (parts of) vocational curricula or training schemes

-- cooperation between training institutions and science in developing (recurrent) training programmes

-- formal and informal networks of scientists and teachers

12. An (obvious) example of cooperation between science and vocational schools is membership of scientists in editorial boards or advisory councils of publishers of vocational textbooks.

13. It is suggested that flows of knowledge between vocational schools and science are considerably underdeveloped in OECD countries.

How to improve (institutionalise) flows of knowledge between schools and science? What are (un)successful examples?

14. Flows of knowledge between schools and industry (2) may also take several (non-exclusive) forms:

-- national agreements on attainment goals for vocational education (United Kingdom: NVQ)

-- sectoral agreements on attainment goals (Australia, Netherlands)

-- twinnings (jumelages) of schools and enterprises (many countries)

-- development of (recurrent) training programmes

-- dual programmes (Germany, Austria, Switzerland, and less extensive: Denmark, France, Netherlands)

-- cooperation betwee education and enterprises in formulating or adapting specific curricula (cooperation as a vehicle for technology transfer)

15. An example of sectoral agreements between vocational schools and industry is provided by the Netherlands. Since 1993/94 (nearly all) school-based secondary vocational education has attainment goals, which have been jointly developed by representatives of secondary vocational education and sectoral industry organisations. It has taken nearly ten years to achieve this result. A starting-point was the formulation of vocational profiles. Next, profiles for vocational curricula were developed. Finally, these profiles were translated into attainment goals. The Minister of Education has approved and enforced these attainment goals.

16. In the OECD/CERI study "Schools and Business: a new partnership" many examples of twinnings and related forms of cooperation are provided. One example is CERTA, a technology resource centre near Paris. The centre was conceived by Renault as part of its strategy to create a workforce that is not only educated but also knows how to apply its knowledge. CERTA models industrial processes with state-of-the-art technology, and offers one week courses to schools in the region of Ile-de-France. The model is designed to teach students how information can be transported around a factory site and can be used to co-ordinate a series of related processes to ensure uniform quality of product. Students take part in an exercise related to the production of a

car component, ensuring that toolmaking, measurement, the shaping of the component and other functions are all brought in harmony. The main objectives of CERTA are:

-- to provide vocational students with practical experience;

-- to stimulate a better understanding of industrial processes among teachers and students;

-- to provide a resources for adult education, and a laboratory of advanced technology for Renault itself.

How to improve (institutionalise) flows of knowledge between schools and enterprises? What are (un)successful examples?

17. Flows of knowledge between schools and firms and between schools and science may be integrated.

18. An interesting example of such integration is provided by South Korea. One of the activities of the Korean Educational Development Institute (KEDI) is to revise vocational curricula. The method might be referred to as "job analysis". It consists of several steps:

-- selection of 8-12 excellent workers;

-- questionnaire (format) to describe the requirements of their jobs;

-- workshop discussion with excellent workers, aimed at identifying new techniques, duties, etc. which relate to their jobs;

-- workshop with teachers on how new job requirements may be integrated in curricula;

-- workshop with scientists and (other) experts on how new job requirements relate to new scientific and technical developments, and how these may be integrated in curricula;

-- revision of curricula (KEDI has the authority to do so.)

19. The extent and the details of flows of knowledge between schools, science and industry are related to the institutional characteristics of VOTEC systems. Generally speaking, with regard to the content of VOTEC there are systems in which professions (in German: 'Berufe') have a central position, systems where branches of industry occupy such a position (Australia, Netherlands) and systems where schools (United States), or the central government (France) are responsible.

20. Initially, the German dual system is organised around occupations. It still receives a lot of input from occupational organisations. In countries like Australia and the Netherlands, vocational curricula in secondary education are agreed upon jointly by educational organisations and sectoral industry

organisations. In the United Kingdom and Scotland, the National Vocational Qualifications play a similar role at the national level. In the United States, vocational curricula are in many cases the primary responsibility of schools themselves. In such a context, twinning between schools and firms is an obvious method of attuning educational contents to the knowledge base of industry. In France the central government has the sole responsibility for the content of education.

What is the impact of these institutional features on the flows of knowledge between schools, science and industry? What is their impact on the innovation of VOTEC-systems (revision of curricula, introduction of new and abandonment of out-dated curricula)?

Technology transfer

21. One type of knowledge flows concerns one-way technology transfer from schools to firms, in particular to small and medium-size enterprises. Vocational schools and training institutions may perform several roles in this respect:

-- they may provide training opportunities which may have been developed in cooperation with science and/or leading (innovative) companies

-- they may perform a consultation function

-- they may participate in technology networks of enterpreneurs in specific branches of industry

Which other roles can vocational schools and training institutions perform with regard to innovation in small and medium-size enterprises?

22. Educational umbrella organisations may also perform important functions with regard to the flows of knowledge from schools to enterprises. For instance, educational organisations such as the German "Bundesinstitut für Berufsbildung" and the German Chambers, the Dutch "Landelijke Organen voor het Leerlingwezen", or the Australian "National Training Board" may (and sometimes do) consult scientists, technological institutes and/or innovative companies in order to improve curricula. Subsequently, school-leavers diffuse this knowledge to the world of work.

Which other functions may educational umbrella organisations perform with regard to technology transfer, especially to small and medium-size enterprises? Should they play the role of "innovation centres"? What to do in countries which lack these kinds of umbrella organisations?

The role of government and industrial relations

23. Government and industrial relations are indirectly involved in the knowledge and information base of VOTEC. In systems where the central government has sole responsibility for curricula, it is also responsible for the organisation of adequate flows of knowledge and the implementation of relevant standards. In decentralised systems, government as well as industrial relations may provide subsidies or other incentives to improve the knowledge base of VOTEC. In many countries representatives of employers and unions participate in the organisation and management of apprenticeship systems. In that case, they have responsibilities with regard to the knowledge base of curricula and training regulations. They may also act as intermediaries in the exchange of knowledge between schools and companies. In both centralised and decentralised systems governments bear responsibility with regard to the institutional infrastructure.

Which (other) roles could governments and industrial relations perform with regard to the knowledge base of VOTEC?

Research questions

24. Efforts to improve VOTEC's knowledge base could benefit from research on existing flows of knowledge between schools, science and industry. Furthermore, research on suitable training techniques might contribute to the quality of vocational education and training. In this area many relevant research questions may be raised. For instance:

-- Which are the dominant flows of knowledge in different VOTEC systems, and how are they organised?

-- What are the strengths and weaknesses in different systems with regard to the knowledge base of VOTEC?

-- How are (institutionalised) flows of knowledge related to the institutional characteristics of VOTEC systems?

-- What can be learned from different VOTEC systems with regard to strenghtening the knowledge base of VOTEC?

-- What training techniques may improve the quality of specified vocational curricula?

Is there need for developing a substantial research agenda concerning the knowledge base of VOTEC?

25. Several international organisations perform relevant functions with regard to research on VOTEC. International comparisons may help to detect strengths and weaknesses of national systems of vocational education and

training, and they may provide ideas on how to improve national systems. International research projects may also raise relevant issues. Relevant international organisations are the European Union (CEDEFOP, European Training Foundation) and the OECD. ILO contributes particularly in the area of further training. Despite all the work in these organisations, international comparison of (components of) VOTEC systems needs further development. Until now, the OECD's temporary VOTEC project is unique. The results of VOTEC activity are highly "perishable" because VOTEC systems are constantly evolving.

Should the the VOTEC activity continue in one way or another? Is a research agenda concerning the knowledge base of VOTEC relevant in this context?